Factor Fun for Fifth Graders

Brief Overview:

Factorization is a necessary step in order to advance into basic addition and subtraction of fractions. Students must understand the concept that numbers can be broken down into factors. Through the activities in this unit, students will be able to demonstrate the steps in identifying factors in pairs of numbers. This will help lead them to identifying greatest common factor among several numbers when adding, subtracting, and simplifying fractions.

NCTM Content Standard/National Science Education Standard:

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- **Describe classes of numbers according to characteristics such as the nature of their factors.**

Grade/Level:

Grade 5

Duration/Length:

3 days (45 minutes each day)

Student Outcomes:

Students will:

- **Identify factors of numbers less than 100.**
- **Identify common factors among pairs of numbers.**
- **Identify greatest common factors among a set of numbers.**

Materials and Resources:

Lesson 1

- **Index cards**
- **Student Resource 1 – Factor Game Directions**
- **Student Resource 2 – Factor Game Board**
- **50 small counters per pair of students**

- **Scratch paper**
- **Large multiplication chart for reteaching**

Lesson 2

- **Student Resource 3 – Common Factor Exit Card**
- **Teacher Resource 1 – Common Factor Exit Card Key**
- **One set of dice per pair of students**
- **Scratch paper**

Lesson 3

- **Student Resource 4 – FACTO**
- **Teacher Resource 2 – FACTO Calling Cards**
- **15 small counters per student**
- **Student Resource 5 – Greatest Common Factor Exit Card**
- **Teacher Resource 3 – Greatest Common Factor Exit Card Key**

Development/Procedures:

Lesson 1 – Identify Factors

Pre-Assessment

- **Distribute index cards and ask students to define the terms: factor, product, and quotient.**
- **Have students give an example of each term.**

Launch

- **Give students a two-digit number that contains more than two factors, such as the number 24.**
- **Ask students to list the factors that when multiplied equal 24. Students need to be able to demonstrate the ability to name all factors of 24.**
- **Have students explain their answers using the mathematical terms. Review the idea that factors can be a result of multiplying or dividing two numbers.**

Teacher Facilitation

- **Divide students into groups of 2.**
- **Distribute 50 counters, Factor Game Directions (Student Resource 1) and Factor Game Board (Student Resource 2) to each group.**

- **Explain game directions and allow students to use multiplication and/or division to determine factors.**
- **Monitor students' use of strategies as they play the game.**

Student Application

- **Students must decide who will be Player A and who will be Player B.**
- **Begin game with teacher circulating to monitor if students are able to identify the factors.**
- **When the whole class is finished, discuss strategies students used to try to get the most points.**
- **Ask students how they determined which two-digit number to select when they were the first player.**

Embedded Assessment

- **During game, monitor the students to determine who is struggling to list most factors and who has mastered the concept.**

Reteaching/Extension

- **For those who have not completely mastered the objective, have students use a multiplication chart to practice identifying all common factors that match a particular product.**

- **For those students who have mastered the objective, give them larger numbers that will require them to list more factors.**

Lesson 2 – Identify Common Factors

Pre-Assessment

- **Ask students to predict what a common factor is in a pair of numbers. Have students explain their thinking.**

Launch

Review students' definition of a common factor. Make sure students include that a common factor is a factor(s) shared by two numbers. Have

students identify the factors of 25 and 30. Then ask students to identify the factors shared by both numbers

Teacher Facilitation

- Divide the class into pairs of students.
- Distribute a pair of dice or numerical cubes to each pair of students.
- Review directions (see Student Application section) to the game and model an example.
- Have students begin the game. Monitor to see if they are creating numbers that have many factors and/or if partners are able to easily form numbers that they know will share factors with their partner's number.
- Check to see if students are using both multiplication and division to identify factors. If students are struggling, help them with this strategy.

Student Application

Directions:

- Player A rolls the dice and creates a 2-digit number using the numbers on the dice.
- Player A identifies the factors of his/her number on the scratch paper.
- Player B rolls the dice and creates a different 2-digit number using the numbers on the dice.
- Player B then identifies the factors of his/her number.
- Player A and B circle the common factors and confirm their answers with their partner.
- This is repeated until each player has rolled the dice ten times.

When the whole class is finished, discuss strategies students used during the game. Ask questions such as, "How did you determine the common factors for your pair of numbers?" and "Did anyone disagree about a common factor for their set of numbers?"

Embedded Assessment

- Students will list common factors on Student Resource 3, which will show the teacher the students' understanding of identifying common factors. Answer key can be found on Teacher Resource 1.

Reteaching/Extension

- **For those students who have not completely mastered the objective, teacher should work with them on checking to make sure that they are able to identify all factor pairs for a set of numbers. Once they are able to identify the factor pairs, give them additional examples and have them identify the common factors.**

- **For those who have mastered the objective, teacher should provide students the opportunity to list common factors for larger numbers or list factors for three numbers.**

Lesson 3 – Identify Greatest Common Factor (GCF)

Pre-Assessment

- **Observe students during launch and monitor that they are able to accurately identify all factors and greatest common factors for each given pair of numbers.**

Launch

- **Have students take out a sheet of paper.**
- **Give them two pairs of numbers, ex. 24 and 36 or 15 and 40.**
- **Have each student list all common factors for the given numbers.**
- **Ask students what they think the term greatest common factor (GCF) means?**
- **Finally students will circle the greatest common factor between the pair of numbers.**

Teacher Facilitation

- **Teacher Preparation- Pre-cut 1 set of FACTO Calling Cards - Teacher Resource 2 (both pages) and place cards in a box or paper bag so number pairs are not visible.**
- **Distribute FACTO Game Board (Student Resource 4) to each student.**
- **Distribute 15 counters and explain FACTO directions below.**

<u>Directions:</u>

As teacher turns over a calling card, a number pair will be announced. Students are to locate the greatest common factor on their FACTO card and place a counter over that number. Students will share their answers so teacher can confirm that the greatest common factors are correct. Greatest common factor answers are listed in parenthesis on the calling cards. Once a student has 4 numbers covered vertically or horizontally, they must call out "Facto."

- During the game, teacher should be monitoring to see if students are covering the greatest common factor for the pair announced.

Student Application

- Begin game and monitor that students are marking only the greatest common factor announced.
- Game is played for at least 4 rounds.

Embedded Assessment

- Distribute Student Resource 5 and verify students are able to identify the greatest common factor for the set of numbers. Answer key can be found on Teacher Resource 3.

Reteaching/Extension

- For students who have not completely mastered the objective, they can continue to practice the process using one of the following websites: www.aaamath.com/g72b-grt-com-fac.html or http://www.math.com/school/subject1/practice/S1U3L2/S1U3L2Pract.html

- For students who mastered the objective, one extension to the lesson is students can identify the GCF of three numbers. An additional extension is to give students a range of numbers and a GCF and have them identify the two mystery numbers that match the GCF and range given.

Summative Assessment

Students will demonstrate an understanding of numbers as products of two factors. The Greatest Common Factor Assessment, Student Resource 6, includes problems that require students to identify factors and greatest

common factors. Students will complete a brief constructed response to explain their understanding of common factors. Answer key can be found on Teacher Resource 4.

Appendix A: Teacher Resources

Teacher Resource 1 – Common Factor Exit Card Key
Teacher Resource 2 – FACTO Calling Cards
Teacher Resource 3 – Greatest Common Factor Exit Card Key
Teacher Resource 4 – Greatest Common Factor Assessment Key

Appendix B: Student Resources

Student Resource 1 – Factor Game Directions
Student Resource 2 – Factor Board
Student Resource 3 – Common Factor Exit Card
Student Resource 4 – FACTO
Student Resource 5 – Greatest Common Factor Exit Card
Student Resource 6 – Greatest Common Factor Assessment

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Name: _____Date: _____

Common Factor Exit Card

1. List the factors of 30 and 36. 44 and 64.

Circle the common factors. factors.

30: 1, 2, 3, **5**, 6, **10**, **15**, **30**

36: 1, 2, 3, **4**, 6, **9**, **12**, **18**, **36**

2. List the factors of

Circle the common

44: 1, 2, 4, **11**, **22**, **44**

64: 1, 2, 4, **8**, **16**, **32**, **64**

FACTO Calling Cards

8,16 **(8)**	**24,36** **(6)**	**27,81** **(9)**
7,13 **(1)**	**8,44** **(4)**	**10,20** **(10)**
4,10 **(2)**	**9,33** **(3)**	**10,35** **(5)**
14,35 **(7)**	**60,70** **(10)**	**81,36** **(9)**
18,24 **(6)**	**7,21** **(7)**	**5,17** **(1)**

FACTO Calling Cards

(page 2)

3,24 **(8)**	**7,28** **(7)**	**8,32** **(8)**
5,40 **(5)**	**6,42** **(6)**	**3,24** **(3)**
5,45 **(5)**	**4,24** **(4)**	**8,13** **(1)**
3,27 **(3)**	**4,26** **(2)**	**7,49** **(7)**
9,56 **(9)**	**8,32** **(8)**	**7,36** **(1)**

Name: _____Date: _____

Greatest Common Factor Exit Card

Find the greatest common factor of 18 and 24.

18 1, 2, 3, 6, 9, 18

24 1, 2, 3, 4, 6, 8, 12, 24

Greatest common factor 6

Explain how you found the greatest common factor.

Name: _____ Date: _____

Greatest Common Factor Assessment

List the common factors for each pair of numbers and then circle the greatest common factor.

1. 30 GCF= 6
36

2. 40 GCF=8
16

3. 28 GCF=7
35

4. 63 GCF=7
14

5. 54 GCF=6
42

6. 20 GCF=5
25

7. 54 GCF=18
18

8. 15 GCF=3
27

9. 8 GCF=4
12

10. 45 GCF=5
65

Brief Constructed Response

Cheryl is making candy baskets for her friends. She has 36 chocolate bars, 18 lollipops, and 12 gummy bears. All baskets must have the same number of each item.

Step A

What is the greatest number of candy baskets she can make without any items left over?

6 candy baskets

Step B

Use what you know about factors to explain why your answer is correct.

Use pictures, words, and/or numbers in your explanation.

Answers may vary but must include 6 as the GCF of the set of numbers.

_____

_____

_____

_____

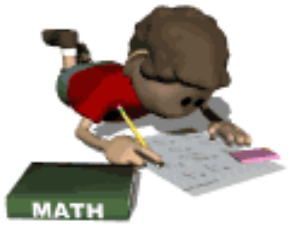
_____

_____

Name: _____ Date: _____

Factor Game Directions

1. Player A selects a 2-digit number on the Factor Game Board, covers it with a counter, and records this number as his/her points on the Score Board.
2. Player B covers all of the factors of Player A's number. He/she must find the sum of these factors using the scratch paper and then records the total as points on the Score Board. Note: Factors and products can only be covered once during the game.
3. If Player B missed any factors, Player A can cover them and add the points to his/her score.
4. Player B now chooses a product that is not covered by a counter, covers it, and records the score.
5. Player A covers all of the factors of that product and records the sum of the factors on the Score Board.
6. If Player A missed any factors, Player B can cover them and add the points to his/her score.
7. The game continues rotating players until all factors and products on the grid have been covered. Players must total their scores to determine which player has the highest score and has won the game.



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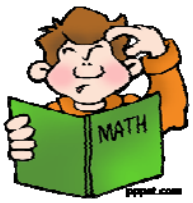
Score Board

Player A		Player B	
Points	**Total Points**	**Points**	**Total Points**

Factor Game Board

1	2	2	2	2	3	3
3	3	4	4	4	4	5
5	5	5	6	6	6	7
7	7	8	8	9	9	10
10	11	12	13	14	15	16
17	18	20	21	22	23	24
25	26	27	28	30	32	33
34	35	36	40	42	45	50

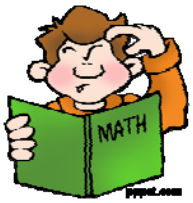
Name: _____Date: _____



Common Factor Exit Card

1. List the factors of 30 and 36.	2. List the factors of 44 and 64.
Circle the common factors.	Circle the common factors.

Name: _____Date: _____



Common Factor Exit Card

1. List the factors of 30 and 36.	2. List the factors of 44 and 64.
Circle the common factors.	Circle the common factors.

F	A	C	T	O
8	**9**	**5**	**1**	**3**
3	**2**	**8**	**6**	**2**

1	**7**	**10**	**9**	**4**
4	**6**	**1**	**5**	**7**

Name: _____Date: _____

Greatest Common Factor Exit Card

Find the greatest common factor of 18 and 24.

18

24

Greatest common factor _____

Name: _____Date: _____

Greatest Common Factor Exit Card

Find the greatest common factor of 18 and 24.

18

24

Greatest common factor _____

Student Resource 6

Name: _____ Date: _____

Greatest Common Factor Assessment

List the common factors for each pair of numbers and then circle the greatest common factor.

1. **30** _____ **18** _____

36 _____

8. **15** _____

2. **40** _____ **27** _____

16 _____

9. **8** _____

3. **28** _____ **12** _____

35_____

10. **45** _____

4. **63**_____ **65** _____

14 _____

5. **54** _____

42 _____

6. **20** _____

25 _____

7. **54** _____

Brief Constructed Response

Cheryl is making candy baskets for her friends. She has 36 chocolate bars, 18 lollipops, and 12 gummy bears. All baskets must have the same number of each item.

Step A

What is the greatest number of candy baskets she can make without any items left over?

_____

Step B

Use what you know about factors to explain why your answer is correct.

Use pictures, words, and/or numbers in your

explanation._____

_____

_____

_____

_____

_____